

## REMARKS

### Interview Summary

The Applicant's representative and the Examiner conducted a telephonic interview on February 4, 2008 between 2:00 PM and 2:22 PM, Eastern Standard Time. Three issues were discussed, including: 1) a difference between Raleigh and an invention to be defined by Claim 1, which is to claim selectably responding differently in reducing interference to different non-target receivers; 2) a characteristic of the "plurality of probe signals" of element (c) of Claim 24 that Applicant's representative submits makes it impractical for step (d) to be effected by any known signal quality comparison method; and 3) a perceived failure of apparatus Claim 42 to distinguish the prior art in terms of structure.

As to item 1), agreement was reached that Raleigh differs from an invention described in the subject application. In particular, Raleigh does not differentiate between non-target (unintended) receivers to which interference is to be reduced by appropriate selection of the transmit weight vector employed for transmitting signals to a target (intended) receiver. Instead, Raleigh merely reduces the effects of interference to all non-target (unintended) receivers generally, without particular regard for one non-target receiver over another. Agreement was not reached on precise language that the Examiner would consider as requiring such a feature in Claim 1, but the Examiner agreed to call the undersigned to facilitate achievement of suitable language if necessary.

As to item 2), no agreement was reached. The Applicant's representative contended that any "plurality of probing signals" in Raleigh that are reasonably encompassed by the requirements of element (c) of Claim 24 are such that comparing reception of such probing signals against each other is impractical. The Examiner was not previously notified of this issue and hence requested the Applicant's representative to fully explain the contention in this response. Such explanation is accordingly provided in remarks set forth below.

Item 3) was discussed only briefly. The Applicant's representative agreed to give particular attention to Claim 42 in this regard.

### Amendments

Prior to entry of the amendment set forth above, forty-seven Claims 1, 4-8, 12-15, 18, 20-22, 24-45 and 47-57 were pending, including twelve independent Claims 1, 6-8, 20, 24, 26 and 41-45. Claims 1, 24, 41-45 and 47 are amended and new Claim 58 is added by the amendment set forth above, such that after entry of

the amendment the application will have forty-eight claims 1, 4-8, 12-15, 18, 20-22, 24-45 and 47-58 pending, including twelve independent Claims 1, 6-8, 20, 24, 26 and 41-45.

No new matter is added by the amendment. Support for these amendments may be found throughout the subject application, with specific examples indicated in the following remarks. Claim 1 is amended to clarify that selectably different weightings are applied to interference determined for different non-target receivers, as discussed in the interview of February 4, 2008. Claims 41-45 are each amended for the same reason, and in a generally similar manner, except employing somewhat different language. The feature of selectably weighting interference to one non-target receiver differently than interference to a different non-target receiver is clarified in each of amended claims 1 and 41-45, based on description beginning at page 29 of the subject application and continuing throughout the application. For example, the parameter  $A_k$  of Equation 1 is a weighting value that may be varied between different receivers to selectably "null" interference more or less strongly for some receivers than for others. This is briefly described in the paragraph immediately below Equation 1 as:

Where  $A_k$  is an adjustment parameter that allows for deeper nulling to some specific users according to a set of requirements such as quality of service (QOS) and power control requirements. An exemplary algorithm for determining the adjustment parameter ( $A_k$ ) is described further below.

The use of  $A_k$  is described in somewhat more detail in a first paragraph of a subsection of the subject application subtitled "Utilization of Adjustment Parameter  $A_k$  - QOS and Power Control." It is discussed in numerous other locations throughout the second half of the subject application.

Claim 42 is extensively amended in response to the Examiner's requirement that it be distinguished from the prior art based on structures. Certain structure is clearly recited in the subject application, including receivers, transmitters, plural antennae of a transmitter, and systems including these structures. Various aspects of the invention are described as embodied in such apparatus as a transmitter, or a receiver, or a system. Modules of substructures within such apparatus are inherently present to perform each essential function. However, implementation details of such modules are not enumerated because they are of no consequence to the embodied invention. All that may be ascertained for many functional modules is that they are comprised of a set of substructures as may be deemed suitable by a skilled designer.

Despite a lack of disclosed detail, such modules necessarily exist to perform the functions performed by an apparatus. Such modules constitute structure, and accordingly are claimed as apparatus limitations,

despite the fact that generally no particular piece of substructure is a necessary component of a given module. As such, the physical structures that are comprised by a particular module are best described by reference to the functions that the module constituents are configured to perform. Even the citation to *In re Schreiber* provided by the Examiner is prefaced with an observation that "features of an apparatus may be recited either structurally or functionally." Accordingly, in Claim 42 as presently amended, the structures that distinguish the claimed invention from the prior art largely consist of structural modules that may consist of any suitable combination of apparatus substructures. The modules are each configured to perform a particular function, and consequently differ from prior art structures in their configuration.

Claim 24 has been amended to require in part (underlining added for emphasis): "feedback that indicates which of the plurality of corresponding transmit probing signals generated in act (c) for each receiver was received better according to a measure of signal reception quality." This amendment addresses the Examiner's rejection of Claim 24 as lacking clarity for failing to clarify a meaning of "better." It is supported by numerous examples throughout the subject application that describe a comparison of which probing signal is better, usually based on a calculation of the received power as an indication of the reception quality of a probe. For example, referring to Figure 7 the subject application recites in part (underlining added for emphasis):

This feedback bit is based on the decision from the MS 229, which indicates which of the even or odd channels resulted in a greater received signal power and determines the weight updates for the transmitter 50. In block 118, the transmitter determines whether the even weight yields greater power by checking the value of the feedback bit. In one embodiment, a value of "0" indicates that the even channel is better.

In this example, the measure of received signal quality is signal strength. The "even channel" is a first weighted probe signal that is transmitted during "even" time periods, while the opposing "odd channel" is a second weighted probe signal that is transmitted during "odd" time periods (see, e.g., block 106 of Figure 7). The quoted excerpt illustrates a correspondence between determining which channel (probe signal) is "better" and determining which channel has a higher received signal quality.

Claim 47 is amended in a similar manner, and the amendment is accordingly supported in a similar manner, as the amendment to Claim 24 remarked upon above.

Claim 42, as currently amended, is distinguished over the cited prior art for reasons substantially similar to those set forth below to demonstrate that Claim 1 is not anticipated by Raleigh. Features deleted

from Claim 42 as previously presented have been moved to new Claim 58. New Claim 58 also recites features supported, for example, by the disclosure cited above as supporting amendments to Claim 24.

Rejections under 35 USC 112

In section 4 of the current Office Action, the Examiner rejects Claims 24-25 and 52-55 as indefinite because it is unclear what "better" means. It is respectfully submitted that the current amendment of Claim 24 obviates this ground of rejection, and the Examiner is accordingly respectfully requested to withdraw this ground of rejection of Claim 24 as currently amended.

Rejections under 35 USC 102 over Raleigh

In section 5 of the current Office Action, the Examiner rejects Claims 1, 4-5, 12-13 and 41-45 as anticipated by Raleigh. Raleigh calculates a weight vector for transmitting signals to a target receiver, but does not selectably treat different non-target receivers differently for purposes of reducing interference to such unintended receivers.

The amendment set forth above amends Claim 1 to recite in part: "wherein calculation of the inverse cost function selectably weighs interference calculated as delivered to one non-target receiver differently from interference calculated as delivered to another non-target receiver." This limitation is an example of a feature that may be succinctly, if imprecisely, referred to as "differential interference reduction." Such differential interference reduction permits the amount of "nulling" of interference to be selected differently for each non-target receiver. Such "nulling" of interference to non-target receivers is sufficiently important, to certain aspects of the invention, that "nulling" is recited even in the title of the subject application.

It is respectfully submitted that the requirement of Claim 1 that is set forth above clearly distinguishes Raleigh, due to the absence in Raleigh of differential interference reduction. Claims 41-45 are each amended to clarify a similar feature as is clarified by the current amendment to Claim 1. Claims 41-45 may accordingly be seen to not be anticipated by Raleigh for substantially similar reasons as set forth above with respect to Claim 1. The remaining claims rejected as anticipated by Raleigh properly depend on Claim 1 as currently amended, and accordingly are not anticipated by Raleigh at least by virtue of such dependence. The Examiner is therefore respectfully requested to withdraw this ground of rejection of Claims 1, 4-5, 12-13 and 41-45.

Rejections over Raleigh in view of Haartsen

In section 6 of the current Office Action, the Examiner rejects claims 24-25, 47-50 and 52-54 as obvious over Raleigh in view of Haartsen. The Examiner is respectfully requested to withdraw this ground of rejection in view of the clarifying amendment to Claim 24, and in view of the remarks below that demonstrate that combining the signal comparison technique of Haartsen (using RSSI) to compare the "plurality of probe signals" that the Examiner has identified in Raleigh is not only nonobvious, but wholly impractical.

Claim 24 requires obtaining feedback for updating a transmit weight vector by comparing the reception quality of different probing signals against each other. Claim 24 describes the required probing signals thus (underlining added for emphasis): "(c) ... a plurality of transmit probing signals for each particular receiver based on the weight vector and parameter set for the particular receiver and on channel estimates for each of a plurality of tracked receivers." The only signal(s) that may be considered to be suggested in Raleigh for transmission to the particular receiver are ordinary information or pilot signals. Such ordinary signals might reasonably be construed as being encompassed by the requirements for "probe signal" set forth in element (c) of Claim 24 by virtue of the fact that the signal is transmitted to the specific receiver using a weight vector that is constantly updated.

However, such "plurality of probing signals" of Raleigh was never intended to enable reception quality of the different signals to be compared against each other by the receiver, as required by element (d) of Claim 24. That is because they were never intended as "probe" or "test" signals, but are merely ordinary signals ordinarily weighted for plural antenna elements. Rather than comparing reception of different probing signals, a conventional receiver (e.g., as in Raleigh), determines estimates for the apparent characteristics of the channel from the transmitter to the receiver, and conveys those estimates to the transmitter. The estimates are not based on any comparison between received probing signals. Because a comparison of signals is not used, a comparison step, such as taught in Haartsen, is not useful with the "probing signals" of Raleigh.

But more than merely being "not useful," comparing reception of the probing signals by the receiver is substantially impossible. Raleigh provides no information to the receiver that would enable the receiver to distinguish one "probing signal" from another. Because the receiver cannot determine when one probing signal is being transmitted, it cannot determine the times to measure the (sole) received signal that correspond to the different "probing signals" that are to be compared. Measurements of different probing signals can only be performed reliably by the receiver if the receiver knows when such probing signals are being transmitted.

Thus, the comparison step of Haartsen cannot be used to compare any plurality of "probing signals" that may arguably be present in a system as described by Raleigh. Haartsen also makes no suggestion for probing signals that might remedy the undifferentiated nature of Raleigh "probing signals." As such, this combination of references cannot render obvious Claim 24, at least as currently amended.

The reasoning set forth above to demonstrate the nonobviousness of Claim 24 over Raleigh in view of Haartsen applies equally to demonstrate that Claim 47 is nonobvious over Raleigh in view of Haartsen. Claim 47 depends from Claim 1, but includes limitations similar to those remarked upon above as distinguishing Claim 24 from a combination of Raleigh in view of Haartsen.

Claims 25 and 52-54 are nonobvious over Raleigh in view of Haartsen at least by virtue of properly depending from Claim 24. Claims 48-50 are nonobvious over Raleigh in view of Haartsen at least by virtue of properly depending from Claim 47. The Examiner is therefore respectfully requested to withdraw the present ground of rejection of Claims 24-25, 47-50 and 52-54.

As presently amended, therefore, it is respectfully submitted that Claim 24 is well distinguished over Raleigh. The remaining claims either have previously been found allowable, and amended as proper independent claims; or they depend from such allowable claim; or they properly depend from Claim 1, or from Claim 24. As such, all of the claims pending in the application are believed properly allowable over the cited prior art, and such allowance is respectfully requested.

#### New Claim 58

It is respectfully submitted that new Claim 58 is properly allowable over the cited prior art at least for the reasons set forth above to demonstrate that Claim 1, as currently amended, is well distinguished over Raleigh, and additionally for at least the reasons set forth above to demonstrate that Claim 24, as currently amended, is nonobvious over Raleigh in view of Haartsen.

#### Conclusion

It is respectfully submitted that the amendment and remarks set forth above overcome each ground of rejection set forth by the Examiner. As such, the Examiner is respectfully requested to reconsider the application, to withdraw all previous rejections, and, barring the discovery of new grounds for rejection, to promptly issue a Notice of Allowance of all pending claims. If any remaining issues appear amenable to resolution by interview, the Examiner is respectfully requested to call the undersigned to suggest such interview in the interest of promptly concluding prosecution of the subject patent application.

**VIA-016-CIP (LSI-004-CIP)**  
**Appln. No. 10/080,751**

**Submission Date: February 5, 2008**  
**Response to Office Action of November 5, 2007**

The Commissioner is authorized to construe this paper as including a petition to extend the period for response by the number of months necessary to make this paper timely filed. Fees or deficiencies required to cause the response to be complete and timely filed may be charged, and any overpayments should be credited, to our Deposit Account No. 50-0490.

Respectfully submitted,

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